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The 2006 South Carolina Envirothon Coordinator is Joy Sullivan.
SullivanJ@dnr.sc.gov

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STATE OF SOUTH CAROLINA
DEPARTMENT OF EDUCATION

INEZ MOORE TENENBAUM
STATE SUPERINTENDENT OF EDUCATION

Dear Envirothon Participant:

On behalf of the South Carolina Department of Education, I am pleased to welcome you to the South Carolina Envirothon program.

Your participation in this competition not only reflects your dedication to the highest standards of education but also your desire to learn more about our state's natural environment. This event is a wonderful opportunity for you and other students from across our state to interact and share ideas as well as engage in a friendly and worthwhile competition. The Envirothon uses the environment as an integrating context to teach science, social studies, and language arts curriculum standards. In the Envirothon, you will apply the knowledge you have learned to real-world problems, perhaps even addressing issues in your own communities. You will work as a team to design solutions and strategies that will protect our natural resources for generations to come.

You are better prepared for the future, and I commend you on your hard work and dedication. I hope that your enthusiasm and excitement are contagious and will infect those around you with a passion for learning. You are already a winner to me for the leadership and self-initiative that you have already shown in the field of environmental science.

Very truly yours,

Inez Tenenbaum

Inez M. Tenenbaum
State Superintendent of Education

IMT/ls

1429 SENATE STREET COLUMBIA, SOUTH CAROLINA 29201 803-734-8492 FAX 803-734-8624 www.state.sc.us/sde

2006 South Carolina Envirothon Steering Committee Members

Dr. Jack Turner, Chairman
Professor of Biology & WEC Director,
USC Upstate and Current Topic Station Manager

Kellee Melton, Vice Chair
State Technology Coordinator
USDA-Natural Resources Conservation Service
and Soils Station Manager

Hugh Caldwell, Past Chairman
District Manager
Richland Soil and Water Conservation District

Diane Curlee, Secretary/Treasurer
Education Coordinator Orangeburg Soil
and Water Conservation District

Lorraine Conrad, Member
Science and Health Coordinator
Richland School District 2

Barbara Kearse, Member
Senior Administrative Assistant
SC Department of Natural Resources

Mary Jane Henderson, Member
Education Coordinator
Richland Soil and Water Conservation District

Elizabeth "Pete" Johnston, Member
Commissioner
Berkeley Soil and Water Conservation District

Larry Wyndham, Member
Commissioner
Berkeley Soil and Water Conservation District

Ed Falco, Member
State Environmental Curriculum Coordinator
SC Department of Education

Monica Franklin, Member
Soil Conservationist
USDA-Natural Resources Conservation Service
and Soils Station Manager Assistant

Lynne LaSalle, Water Quality Station Manager
Champions of the Environment Coordinator
SC Dept. of Health & Environmental Control

Stephan Bullock, Water Quality Station Manager
Drinking Water Coordinator
SC Dept. of Health & Environmental Control

Russell Hubright, Forestry Station Manager
Asst. Environmental Education Coordinator
SC Forestry Commission

Amy Maxwell, Public Affairs
Public Affairs Specialist
USDA- Natural Resources Conservation Service

Sabrenna Bennett, Public Affairs
Public Affairs Assistant
USDA- Natural Resources Conservation Service

John Alford, Oral Presentation Station Manager
Region 2 Coordinator
SC Department of Natural Resources

Carol J.D. Broadus, WEC Program Coordinator,
USC Upstate and Current Topic Station Manager

Tammy Wactor, Wildlife Station Manager
Program Coordinator
SC Department of Natural Resources

Joy Sullivan, Envirothon Coordinator
Program Coordinator
SC Department of Natural Resources

1
Introduction and Goals

Welcome to the 2006 South Carolina Envirothon. This handbook contains information you will need to know to participate in this event. You have already registered and are now ready to begin preparing to compete against teams from across the state. We are sure your participation will be beneficial and prove to be a valuable learning experience.

The Envirothon is an integrated education experience. Over the course of several months of study participants prepare themselves for testing in the five stations & orals.

The current topic is Water Stewardship in a Changing Climate. This year's Envirothon is a tremendous opportunity to learn more about these issues while promoting team work and critical thinking skills in your students.

Designed to foster cooperation and teamwork, teams are tested not only on their basic knowledge in these topic areas, but their ability to apply that knowledge to solve real-life problems. Problem solving and teamwork are skills that will enhance the participants' ability to take leadership roles after high school or college, no matter what their chosen field or career.

The Envirothon began in Pennsylvania in 1979 in a single county. The program had such appeal that by 1988, it had expanded into three states and had taken on a national scope. Since that time, the program has grown to include 42 states and eight Canadian provinces.

The overall goal of the Envirothon is to promote environmental education so that succeeding generations will be more environmentally literate, and possess the skills and knowledge to make informed decisions regarding the environment. We whole heartedly endorse this program which has as its only goal and agenda the enhancement of education and environmental literacy.

Questions regarding the SC Envirothon may be directed to Joy Sullivan, Envirothon Coordinator-Land, Water & Conservation Division of the South Carolina Department of Natural Resources (803)359-3165 or SullivanJ@dnr.sc.gov

2
Quick Facts Sheet for Teachers and Administrators

- The Envirothon is North America's largest environmental competition for high school students.

- The SC Envirothon was formally endorsed by SC Superintendent of Education, Inez Tenenbaum in November of 1999 as a worthwhile educational experience.

- All Envirothon learning objectives have been correlated to the
  • 2000 Science Curriculum standards,
  • 2000 Social Studies Standards and
  • 2002 Language Arts Curriculum Standards.

- On the day of the Envirothon competition, May 12, 2006, each team will complete five written exams and perform their Oral Presentation for a panel of judges. (This is a rigorous academic test, not a field trip!)

- A Coaches' Workshop will be held Saturday, February 11, 2006 to assist teachers in preparing their teams. Teachers will receive resource packets and attend classes in each of the five topic areas (soils, forestry, water quality, wildlife and Water Stewardship in a Changing Climate).

  "The Envirothon is an excellent way for teachers to engage their students by using standards-based curriculum materials while fostering critical thinking and leadership skills. It provides many real world examples of common classroom concepts and emphasizes how environmental problems require an interdisciplinary approach. I would encourage all teachers to explore the benefits of incorporating the Envirothon into their curriculum."

  - Linda Sinclair,
  State Science Coordinator
  SC Department of Education

"The Envirothon makes a difference to me because…."

Anonymous quotes from student evaluations of Envirothon competitions:

"Envirothon has taught me a great deal about problems in our neighborhoods. Now I know how to deal with it and pass on my knowledge."

"I realized that environmental science is more interesting than I thought."

"I gained knowledge of water quality and nonpoint-source pollution."

"The competition was great. I enjoyed it. The experience was wonderful. I made new friends at the competition."

"The most important part of the competition to me was learning how to synthesize all the information into an Oral Presentation."

"I learned that different areas have different species of wildlife, trees, etc."

"The most important part of the competition for me was working with friends on a long-term goal."

"Nonpoint source pollution has more effect on the environment than I realized."

"I learned a lot of valuable information for the future."

"I had a good time."

"I learned a lot about the world around us."

"What was most important to me was learning to do things differently for the environment."

Comments from Coaches evaluation forms:

"My students really enjoy the Envirothon and we learn a lot together!"
— Twila Shaw, James Island Christian School, Charleston

"The Envirothon is science in action and emphasizes real world problems!"
— Robert Brady, Blue Ridge High School, Greer

"This is a valuable program, especially for students who are interested in South Carolina's natural resources."
— Cynthia Gardner, White Knoll High School, Lexington

"It's a great way to involve students and it fits easily into my daily lesson plans."
— Stephanie Taylor, Mauldin High School, Mauldin

"The Envirothon competition has been a wonderful tool in teaching my students about our environment! It encourages teamwork and the desire to learn as much as possible. Thanks to the coordinators of the Envirothon for listening to the suggestions of the students over the past four years that we have been involved. It means a lot to them to know that their opinion is valuable. The second and third place prizes that were added last year have been particularly encouraging to the team. These prizes encourage even a fledgling team to participate. Thanks for all you do for our students!
— Ruth Taylor, Mayo High School for Science, Math and Technology, Darlington SC

3
Introduction to Ecosystems Approach

One goal of Envirothon is to promote the desire of students to learn more about the environment, and to apply principles of resource management and ecology. Any ecological system (ecosystem) consists of a community of living organisms and their local physical environment. The living and non-living elements of an ecosystem are connected through flows of energy and the cycling of chemical elements. No single organism, population or species is able to produce all of its own food and to recycle all of its metabolic products. This ecosystem concept is important because it conveys one of the key insights that we have learned from the science of ecology .... everything is related to everything else.

Another goal of Envirothon is for students to develop critical thinking and problem solving skills. Environmental problems are effectively addressed by considering the interacting elements of a system, not each sector in isolation. Ecosystem management is currently the standard approach for many government, industry and community based initiatives. The South Carolina Envirothon has adopted the ecosystems approach.

Written tests will occur at testing stations. Each station will focus on one of the five core subject areas. However, each station will incorporate elements of the other subjects. Questions at the stations, as well as the oral presentation scenario, will be multifaceted to ensure that students will be challenged to think critically and consider “the big picture.”

4
Sponsors

The South Carolina ENVIROTHON is conducted in partnership with:

- SC Soil and Water Conservation Districts
- SC Department of Natural Resources
- SC Department of Health and Environmental Control
- SC Forestry Commission
- SC Department of Education
- Clemson University
- USDA - Natural Resources Conservation Service
- Soil & Water Conservation Society - SC Chapter

Funding is provided by "Friends of the ENVIROTHON" (individuals, industry, and businesses). For more information, or if you desire to financially support the South Carolina ENVIROTHON, please contact your local Soil & Water Conservation District.

Additional funding is provided by individual Conservation Districts.

Friends of the Envirothon include:

- Voridian - A Division of Eastman Chemical Co.
- Power for Wildlife
- LanXESS
- NBSC
- Clemson University Sandhill Research and Education Facility
- Canon USA, Inc.
- Clemson University Cooperative Extension
- Johnson, Johnson, Whittle & Snelgrove
- Environmental Education Association of South Carolina
- Harry Hampton Fund
- Harry O. Weeks Jr.
- John H. Parris
- South Carolina Conservation Districts Foundation, Inc.
- South Carolina Soil and Water Conservation Society
- Southeastern Clay Company
- York Conservation District

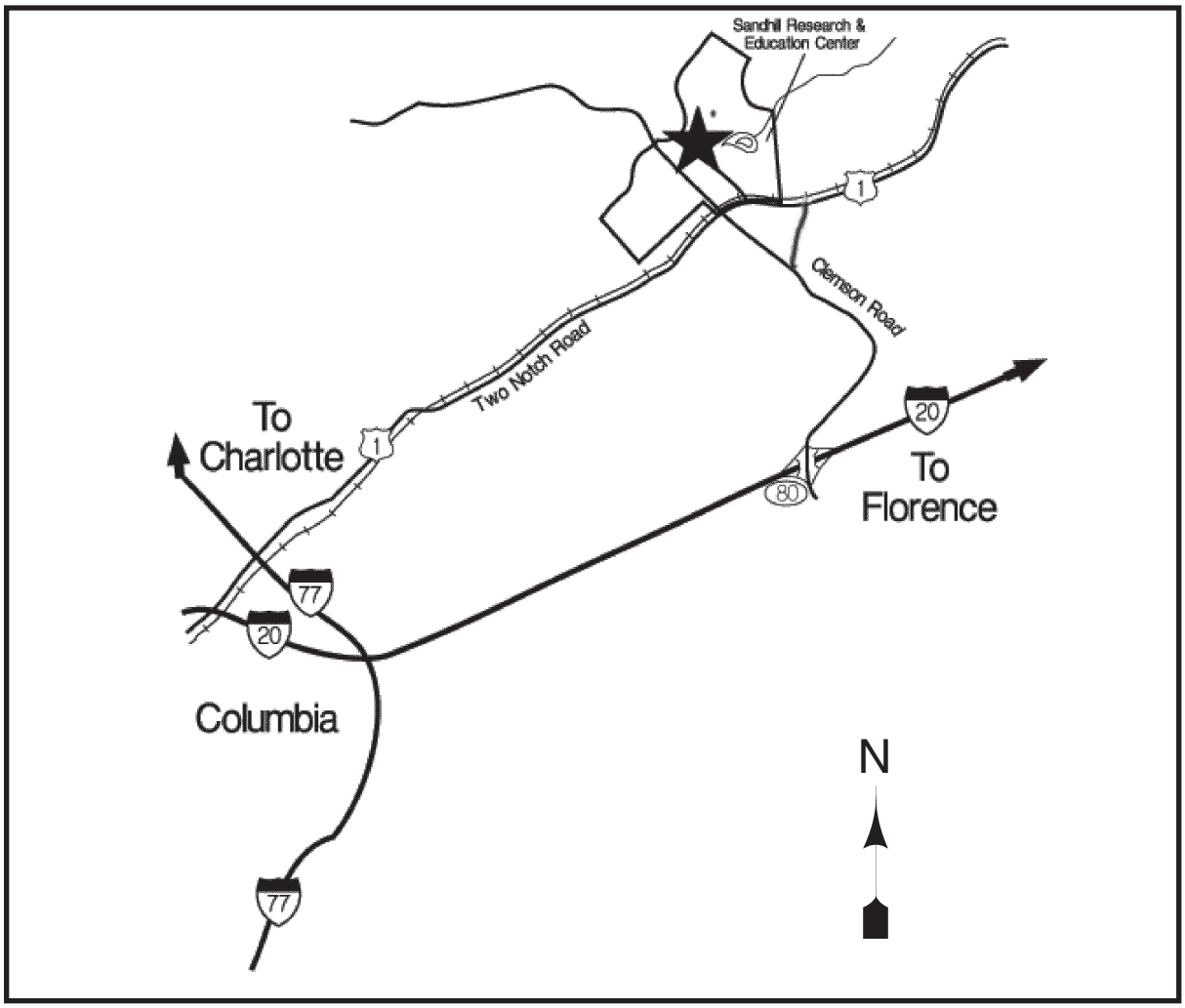
All of the Conservation Districs of South Carolina (See page 40 for contact information)

- Abbeville County
- Aiken County
- Allendale County
- Anderson County
- Bamberg County
- Barnwell County
- Beaufort County
- Berkeley County
- Calhoun County
- Charleston County
- Cherokee County
- Chester County
- Chesterfield County
- Clarendon County
- Colleton County
- Darlington County
- Dillon County
- Dorchester County
- Edgefield County
- Fairfield County
- Florence County
- Georgetown County
- Greenville County
- Greenwood County
- Hampton County
- Horry County
- Jasper County
- Kershaw County
- Lancaster County
- Laurens County
- Lee County
- Lexington County
- Marion County
- Marlboro County
- McCormick County
- Newberry County
- Oconee County
- Orangeburg County
- Pickens County
- Richland County
- Saluda County
- Spartanburg County
- Sumter County
- Union County
- Williamsburg
- York County

5
The State Competition

The 10th annual statewide Envirothon competition for South Carolina will be held at Clemson Institute at Sandhill Center near Pontiac, South Carolina on Friday, May 12, 2006 .

A schedule will be mailed to coaches prior to the event.



Take I-20 to Exit 80 (Clemson Road). Take Clemson Road north past McDonald's and take Two Notch exit right. At light take left - almost immediate right. Cross RR tracks into complex. Cross the railroad tracks and follow the signs.

For more information contact:

Clemson University Center for
Community & Economic Development
Formerly Sandhill Research and Education Center
900 Clemson Rd.
Columbia, South Carolina 29224-3205
Telephone: (803) 788-5700
Fax: (803) 736-4418

6
Rules for Competitors

1. Students in grades 9-12 or their equivalent as of January 1, 2006 are eligible to participate.
2. Teams must have at least three and not more than five members. Each team must be accompanied to the competition by a coach or advisor. Transportation to and from the competition is the responsibility of the team and their coach/sponsors.
3. A school may send up to two teams to the state competition. Each team will consist of members from the same school, organization and/or association. Two schools may join together to send a joint team, but then forfeit their rights to send individual teams (a school may not contribute members to more than one team).
4. **Only ONE alternate will be allowed per team.** Additional students will not be allowed to participate in the competition.
5. Thirty (30) minutes will be allotted for each of the five testing stations during the competition as well as the oral presentation station.
6. There will be written questions at each of the five testing stations. Question format may be true/false, multiple choice, matching, fill in the blank, or practical exercises.
7. Test questions will be taken from the information in the suggested references provided to coaches by the Envirothon Committee.
8. During the competition, team members will work together to answer the test questions, completing one test and submitting it to the resource professional in charge of the station before moving on to the next station. Once the competition has begun, the team will rotate through all six stations **AS A TEAM.**
9. The resource professional in charge of the testing station has final authority with respect to the test questions and answers.
10. In the event of a tied score for first, second or third place, the team with the highest score on the Oral Presentation will be considered the winner. Further rules are documented and available to determine winners in the event a tie still exists.
11. Oral presentations will be evaluated by a panel of five judges. The high and low score from each panel will be discarded and a team's oral presentation score will be the average of the remaining three scores.
12. The state winner is eligible to compete at the Canon Envirothon. If the state winner cannot participate, the second place team may represent South Carolina in the North American competition.
13. In the event a procedural dispute or question arises that is not covered in this manual or its addenda, the issue will be decided by a committee made up of the resource persons assigned to the testing stations and the Envirothon Coordinator.
14. Team members (or others with the teams) with allergies or medications must bring their own supplies.
15. Cameras and video recorders, laptops, and tape recorders are prohibited in the vicinity of the testing stations. Allowances will be made in advance for the press.
16. The competition will be held outside regardless of the weather. Team members should wear appropriate clothing (sneakers, jeans/shorts, tee shirts). If it is warm and sunny, please consider sun screen. **(Do not wear any item of clothing that may identify your team by city, county or school.)**
17. Any infraction of the rules will be reviewed by the Steering Committee and may become grounds for disqualification. The rules of the SC Envirothon are subject to change on a majority vote of the Steering Committee. Any changes will be published and distributed prior to the State Competition.

7
Coach's Pre-Competition Checklist:

The Coach is the backbone of the Envirothon team. This person serves to organize the team, motivate the members, and present materials pertinent to the Envirothon. Throughout the year, the coach guides the team's preparation for the competition. There are two major components of the coach's job--teaching team skills and transferring to the members a strong environmental ethic. A coach has a tremendous responsibility and is to be congratulated for making such an important contribution to the growth of the team members' knowledge and experience.

Maintain close contact with the local Conservation District Office (a directory is included in this handbook). Ensure the following check-list is completed:

_____ $100.00 Registration Fee paid and participation confirmed with local Soil & Water Conservation District by the registration deadline of March 17, 2006.
All registration fees are non-refundable.

_____ Transportation has been arranged to the state competition.

_____ Coach has signed up for Coaches Workshop February 11, 2006 and confirmed attendance with Envirothon Coordinator (attendance is not mandatory). Workshop registration deadline, January 27, 2006.

_____ Coach has sent in the Team Registration Form listing who the team members will be by the March 17, 2006 deadline. Make sure all the team members have sent in both the medical and photo release forms. Failure to do so may be grounds for disqualification.

_____ Team members are familiar with rules of the competition.

_____ Team members are trained in each of the five test areas: Soils, Aquatics, Forestry, Wildlife, and Water Stewardship in a Changing Climate.

_____ Team has prepared their oral presentation and visual aids in accordance with the rules.

8
Day of the Event Reminders

1. **BE ON TIME**! Allow ample travel time. Arrive 30 minutes prior to your assigned registration time.

2. Report to the registration tent to receive instruction and supplies. (Coach only)

3. Everyone MUST wear their name tags (provided at Registration). Persons not wearing name tags at the testing stations will cause their teams to be disqualified. Advisor name tags are coded differently from team name tags.

4. **COACHES MAY NOT CONSULT WITH OR ACCOMPANY THEIR TEAM ONCE THE COMPETITION HAS BEGUN!** Failure to follow this rule may result in disqualification.

5. No pets of any type allowed on the competition site. No alcohol, drugs or tobacco will be allowed. No smoking is allowed on the competition site.

6. Winning teams must complete necessary paperwork before leaving the competition, see Awards and Recognition

7. **Familiarity with the rules and regulations of the competition is expected of all coaches and team members.** Ignorance of a rule is not an acceptable excuse for failure to comply.

9
Awards and Recognition

Awards will be given in the form of a scholarship to the college or university of the recipients choice. All participants will receive an Envirothon T-Shirt.

- 1st Place - $500 per student, $500 coach
- 2nd Place - $250 per student, $250 coach
- 3rd Place - $125 per student, $125 coach
- Honorable Mention - $75 per student, $75 coach — Cash Award
- Station Awards - $50 per station - coach — Cash Award

CLAIMING YOUR SCHOLARSHIPS AND AWARDS

After the competition ends and winners are announced, paperwork will be provided to the winners. The paperwork must be completed so that the Envirothon has a record of individuals names, addresses and other personal information. Honorable Mention and Station Awards are cash awards. A check will be mailed to the individuals approximately (1) week following the competition. For claiming scholarships, see the sample letter below.

SAMPLE LETTER

May 12, 2006

Congratulations! As a member of the First Place Team at the 2006 SC Envirothon, you have won a $500 College Scholarship!

To claim your scholarship you must be enrolled in an accredited two-year or four-year college or university. Once you are registered with your school, send a written request to the address below:

Joy Sullivan
Envirothon Coordinator
123 Park Rd.
Lexington, SC 29072

Along with your letter, you must include:
· • proof of enrollment (a notarized letter from the registrar or a copy of your official transcript) and
· the address of the college Treasurer's Office.
· • a copy of this letter

Checks will be made payable directly to the school and mailed to the Treasurer's Office. Scholarship requests take 4-6 weeks to process.

Your scholarship will be available to you for five years from the date of this letter.

Your scholarship funds were provided courtesy of Voridian. You are encouraged to send a thank you note to Voridian. They would enjoy hearing what school you will be attending and in what subject you plan to major. Please send thank you notes to:

Ms. Hanneke Counts
Voridian
PO Box 1782
Columbia, SC 29202

If you have any questions regarding your scholarship, feel free to contact the SC Envirothon Coordinator, Joy Sullivan, at (803) 359-3165 or email her at *SullivanJ@dnr.sc.gov*

10 Soils

Station Managers: Kellee Melton & Monica Franklin — USDA-NRCS

Learning Objectives:	**SC 9-12 Curriculum Standards:**
1. Explain the diagnostic significance of soil color. Be able to describe how soil color is measured and what processes produce different colors.	Physical Science (Chemistry) C.1.a., 2.a., 4.e.
2. Describe the factors which influence soil texture and structure and be able to explain how these properties influence a soil's ability to retain water and nutrients and tendency to erode. Explain how this further influences the hydrologic and nutrient cycles in an ecosystem.	Life Science D.1.a., D.5.a. Physical Science (Chemistry) 3.a.2,3,4. Earth Science C.3.d. Social Science 10.8.4.
3. Derive information from a soil survey and explain the interaction between soil type and plant communities as well as suitability for various land use practices.	Life Science D.1.a., D.4.d., D.5.b. Social Studies 10.4.1,6., 10.5.6., 10.7.8.
4. Explain the features of a soil profile, the five factors of soil formation and the origin of soil parent materials.	Earth Science B.1.a., C.3.a,c.
5. Describe the characteristics of wetland soils and explain where wetlands are found and why.	Life Science D.5.b.
6. Describe various soil constituents (sand, silt, clay, organic matter) and their properties. Relate these properties to soil fertility (nitrogen (N), phosphorus (P), potassium (K), calcium (Ca)), soil pH and nutrient cycles.	Life Science D.1.a. Physical Science (Chemistry) 3.a.2,3,4.
7. Be able to give an overview of soils of the world including environmental factors of soil formation, natural vegetation types and soil fertility, and world geology.	Social Studies 10.6.4,5,6 Earth Science A.3.b.
8. Be able to describe South Carolina Landform Regions and what they indicate about SC geology, climate and land uses.	Earth Science A.3.e., C.3.b. Social Studies 10.8.7.
9. Discuss impacts on agriculture due to changing water regimes, including precipitation, ground water, erosion and pollution.	Earth Science A.3, a, b & e. Life Science D. 4. b, D. 5. a. Social Studies (9-10) III 10. 8. 2., .4, .5, III 10. 9. 4, .5., .6 (11-12) IV 12. 9 . 10
10. Explain the potential risks and benefits of climate change on agricultural production.	Earth Science A.3, a, b & e. Life Science D. 4. b, D. 5. a. Social Studies (9-10) III 10. 8. 2., .4, .5, III 10. 9. 4, .5., .6 (11-12) IV 12. 9 . 10

11 Water Quality

Station Managers : Lynne LaSalle & Stephan Bullock, SC DHEC

Learning Objectives:	**SC 9-12 Curriculum Standards:**
1. Identify and describe the phases of the water cycle. Understand the chemical and physical properties of water and explain their implications for aquatic ecosystems.	Life Science D.1.b
2. List and describe the pollutants and contaminants typically associated with nonpoint source pollution. Be able to provide examples of best management practices (prevention and reduction techniques) that address nonpoint source pollution.	Science Inquiry D.1., Earth Science B.1.b,c., Physical Science (Chemistry) B.6.c,d., C.1.c. Social Studies 10.8.1, 10.9.4, 12.7.7-12.
3. Know how to use a key and visual characteristics to identify aquatic organisms. Know why aquatic macroinvertebrates are good bioindicators of water quality. Give examples of aquatic macroinvertebrate sampling techniques and equipment.	Science Inquiry B.10., Life Science C.3.b., D.4.b..
4. Understand how to delineate the watershed boundary for a small water body. Be able to determine if a watershed boundary has been drawn appropriately.	Social Studies Literacy Elements I and L
5. Understand the processes that allow groundwater to be stored, replenished and utilized. Explain the different types of aquifers and how each type relates to water quality and quantity.	Life Science D.1.b, 4.b., Earth Science B.1.a,b,c, B.2.a
6. Identify wetland functions and know the characteristics used to define a wetland. Know how to identify the characteristics of a wetland. Know the primary benefits of wetlands and be able to name wetland functions and values.	Life Science D.2., D.3., D.4.
7. Explain and identify the connection between land uses in a watershed and water quality. Including problems associated with land use changes. Utilize maps to determine the potential for water quality problems.	Science Inquiry A.1.d.1, A.2.c
8. Be able to interpret water quality data for a body of water. Be familiar with the methods used to measure the water quality parameters turbidity, phosphorus, nitrate, pH, coliform bacteria and dissolved oxygen. Be able to explain the significance of these parameters to a water body and explain the possible causes and consequences when levels of these factors are high or low.	Science Inquiry B.10., Life Science, D.1.b., D.4.b., D.5.e.
9. Know why the Clean Water Act and the Safe Drinking Water Act were enacted. Be familiar with the actions required by each to protect water quality.	Science Inquiry B.3., B.10., Life Science D.5.e., Physical Science (Chemistry) C.1.c., Social Science 12.5.13,14, 12.9.10

12 Forestry

Station Managers: Jerry Shrum & Trip Miller, SC Forestry Commission

Learning Objectives:	**SC 9-12 Curriculum Standards:**
1. Identify common South Carolina trees without a key.	Life Science, C.3.a.
2. Identify specific or unusual species through the use of a dichotomous key.	Science Inquiry B.2. Life Science C.3.a.
3. Understand how wildlife diversity relates to: forest communities, forest species, forest age structure, snags and den trees, availability of food and cover, and riparian zones.	Life Science D.3.b., D.4.b,d,e. Social Studies 10.6.5.
4. Understand basic forest management concepts such as: harvesting techniques, regeneration methods, and insect and disease control.	Science Inquiry E.1,2. and G.1. Life Science D.4.b,d,e.
5. Be familiar with the use of a Biltmore stick, compass and other forestry tools.	Science Inquiry B.2.
6. Understand the value of trees in urban/suburban settings and the factors affecting their health and survival.	Life Science D.5.b. Social Studies 10.5.6., 10.7.8., 10.8.1.
7. Understand how following Best Management Practices will help protect soil and water quality.	Life Science D.5.b. Social Studies 10.8.4., 10.8.8
8. Understand the effects of climate change on Forests, including species composition, wildfire danger, and forest pests.	Earth Science A.3, a, b & e. Life Science D. 4. b, D. 5. a. Social Studies (9-10) III 10. 8. 2., .4, .5, III 10. 9. 4, .5., .6 (11-12) IV 12. 9 . 10

13 Wildlife

Station Manager: Tammy Wactor, SCDNR

Learning Objectives:	**SC 9-12 Curriculum Standards:**
1. Identify habitat requirements for common wildlife species. Be able to use tracks and other signs, such as scat, feathers etc..., to identify common wildlife species.	Life Science D.4.b.
2. Describe food webs (including predater-prey relationships) and cite examples.	Life Science D.2.a, D.3.b.,D. 4.e., D.2.a., D.3 b., D.4.e.
3. Evaluate a given habitat for its suitability for a designated species, given a description of the habitat needs of the species.	Life Science D.4.b.
4. Describe ways that habitat can be improved for specific species by knowing their habitat requirements.	Life Science D.4.b.
5. Describe factors that limit or enhance population growth. Discuss the concept of carrying capacity and limiting factors.	Life Science D.4.b,c,e.
6. Discuss various ways the public and wildlife managers can help in the protection, conservation, management and enhancement of wildlife populations.	Life Science D.4.a.,D.s.b.c., D.5.b,c. Social Studies 10.5.6.
7. Describe the potential impact of the introduction of non-native species.	Life Science D.5.c.
8. Describe major factors affecting threatened and endangered species and methods used to enhance population growth and stability of these species. Be able to cite South Carolina examples.	Life Science D.3.b, D.5.a,b,c.
9. Understand the roles of wildlife in an ecosystem.	Life Science D.2.a.,D.3.a.,b.
10. Describe physical and behavioral adaptations among wildlife to their habitats and cite examples.	Life Science F.2.a,,e,f.
11. From the mountains to the sea, SC has many unique natural areas. Be familiar with two unique natural areas in South Carolina: Jocassee Gorges and the ACE Basin.	Social Studies (9-10) III 10. 5. 2, .3, .4 (11-12) III 12. 8. 1

14 Water Stewardship in a Changing Climate

Station Managers: Dr. Jack Turner & Carol Broadus, USC Upstate

Learning Objectives:	SC 9-12 Curriculum Standards:	
1. Recognize that liquid water is unique in the universe; there is a limited amount of freshwater on earth, and that climate changes can affect the amount of available freshwater.	Life Science	II.D.4.b III.B.1.c
2. Understand that water crosses county, state, and national boundaries. Due to world freshwater distribution, conflicts can arise over water access. Understand that changes in climate can cause increased social conflict in some areas. Students should also understand the role of conservation in the future allocation of water.	Life Science Econ	II.D.3.b II.D.4.b II.D.4.e 1.1
3. Evaluate how climate changes may affect different ecosystems, human social structure, and economies by examining several different relationships. These relationships include climate change and agriculture, and climate change and the traditional culture/hunting patterns of the Inuit.	Life Science	II.D.5
4. Comprehend the science and modeling of climate change while analyzing the impact on both the quantity and quality of water available to humans and ecological systems.	Life Science Econ	II.D.4 II.D.3 2.1
5. Realize that global climate change may have positive impacts on some ecosystems and nations.	Life Science Econ	III.A.3.e 1.1
6. Be aware of the connection between industrialization and climate change. Predict how climate change may affect world trade and the global economy. Also understand how industry and various pollutants cause acid rain and the effects from acidic rainfall.	Life Science	II.D.5.e
7. Understand how changes in weather patterns can affect groundwater recharge areas, focusing on issues such as the importance of our groundwater resources, over-pumping, salt water intrusion, and subsidence.	Life Science	III.A.3.a
8. Examine extreme weather events in the context of shifting climate trends.	Life Science	III.A.3.e II.D.5.a
9. Understand the current jurisdiction, regulatory, and governing bodies of our water resources including the United Nations. Infer what actions can be done today to mitigate the issues of tomorrow; focusing on studies such as Prairie Adaptation Collaborative.	Econ Econ	1.1 2.3
10. Understand the impact of global warming on the ecosystems and people of South Carolina, and the importance of water to the continual growth of the state. Examine how the state water plan manages the state's water resources.	Life Science Econ	II.D.5.a 1.1 1.3 2.3

15 Oral Presentation

Station Manager: John Alford, SCDNR

Learning Objectives:

1. Research the scientific, political, historical and social issues surrounding the current topic. Evaluate the evidence and construct a solution for this issue.

2. Using materials and information gathered in your research, construct and present your solution to a diverse judging panel of resource and communications professionals using no more than 2 visual aids.

3. Respond to questions from the judging panel at the conclusion of your presentation. Questions may be direct (on the material you presented) or indirect (interpretive, based on assumed background knowledge).

SC Language Arts Standards:

English 1-4:
Reading Process & Comprehension
R1.7, R 1.8

Writing Process
W2.1-W2.3, W3.1-W3.3
Communication: Speaking
C1.1-C1.7, C1.10 - C1.13

Communication Listening
C2.1, 2.3, 2.4, 2.6

Gathering Information
RS 2.1-2.6

Preparing & Presenting Info.
RS 3.1-3.3

15 Oral Presentation

Team members are asked to research issues and information surrounding the scenario below. Any source of information is allowed although teams should carefully screen their facts for accuracy and objectivity. Teams will be allowed ten (10) minutes to present, with two (2) minutes of question and answer period following the presentation. All team members must speak and participate in the presentation. Two visual aids will be allowed (see materials list below).

Background:

The earth as a system is constantly changing naturally; however, human culture and action also impact and change the environment. Recently, issues such as air, land, and water pollution, an increase in greenhouse gases, and ozone depletion became hot topics of worldwide concern. The earth is changing, but this time it is a direct result of human behavior.

There have been several attempts led by the United Nations to develop agreements between nations to slow environmental degradation. The Kyoto Protocol was one of the most recent. This conference was held in 1997 in Kyoto, Japan with over 160 nations in attendance. The major accomplishment was an agreement to reduce the amount of carbon emissions by varying amounts depending upon the nation. The major issue is, the United States is one of the largest contributors to greenhouse gasses, and has not ratified the Protocol.

Current models suggest that the effects of global climate change will be the most obvious and severe in polar regions. The artic can act as an indicator of climate changes because of its distinctive characteristics. Artic regions have limited sunlight, extreme temperatures, permafrost, tundra, glaciers, and unique wildlife. Changes in temperature, the ocean, and air chemistry leave an impact on the artic landscape. Evidence of climate change can be seen in the early melting of sea ice, thawing of permafrost, and overall warmer temperatures.

Alaska has five major climate zones; one of these an artic zone, and permafrost covers almost 1/3rd of the state. The state has many natural resources such as oil, timber, and fisheries. In 1995, Alaska ranked twelfth in the world in commercial fish harvests. Alaskan wildlife and culture is important economically as well, since it drives the tourism industry. Lastly, it is also the home of many indigenous groups. As climate changes redesign the face of Alaska, both industries and indigenous cultures are affected.

Scenario

The Alaskan state government has created a council of politicians, community leaders, timber and fishery labor representatives, and indigenous leaders. The council would like to produce a presentation for the tourist industry. The presentation is meant to educate visitors about the climate issues and concerns facing the state. The presentation should give a thorough but broad explanation of global climate changes, but should focus on how climate change will impact Alaskan ecology, economy, and indigenous cultures. The presentation should last 10 minutes, allowing 2 minutes for a question and answer session.

15 Oral Presentation

Learning Objectives:

1. Research the possible consequences of climate change on the artic landscape; focusing on the attributes of the tundra and tundra wildlife.

2. Explore the connection between U.S. economy, Alaska, and climate change.

3. Understand the effects of climate change on the lives of indigenous cultures such as the Gwichen and Inuit.

4. Using accurate research, prepare a presentation on how climate change will affect the Alaskan landscape. The presentation should argue as to whether the effects will be minimal or severe, and whether the changes will occur gradually or rapidly (Definitions of minimal, severe, gradual, and rapid should be set by the presenters).

5. Explore the role of the Kyoto Protocol and climate change.

ORAL PRESENTATION ACTIVITY WRITTEN AND DEVELOPED BY:

Dr. Jack TurnerProfessor Biology and WEC Director USC Upstate
Carol J. D. Broadus, WEC Program Coordinator USC Upstate

Materials allowed for visual displays:

Teams are limited to two (2) standard pieces of white posterboard (24"x30") prepared with markers, crayon, construction paper, tape, string, cut-out pictures, etc. No three dimensional creations are allowed (posters must be able to be stacked and stored compactly). Use one side of the poster only.

No presentation aids or materials other than the posters and index cards specified below will be permitted at the presentation. Students will be allowed five (5) 3.5 x 5 inch index cards each to assist them during the presentation. No materials other than the aids mentioned above will be allowed.

Scoring procedures:

A panel of judges with expertise in the current topic, natural resource management and public communications will score the presentation of each team using the score sheet found at the end of this section of the manual. Also included is a detailed explanation of the scoring procedure. In accordance with Canon Envirothon procedure, the highest and lowest scores will be dropped and the remaining three scores averaged. This average will be the team's score for Oral Presentation.

Awards and Recognition:

The Awards ceremony may be videotaped and all rights to the video footage will belong to the South Carolina Envirothon.

South Carolina Envirothon
Judges Scoring Sheet for Team Oral Presentations

Scale for Scores: 0 = not at all; 2 = poor or poorly; 4 = fair or slightly well; 6 = good or well; 8 = excellent or very well; 10 = outstanding

Team Number: _____

Judge's Number: _____

Part 1: Preparation and Presentation (60 Points maximum)	**Circle Score** - post total here ===>					
A. How well did the presentation address or identify:						
1. The interrelationship between natural resources, different management strategies and human health and well being.	0	2	4	6	8	10
2. All the stakeholders affected.	0	2	4	6	8	10
3. Relevant influences on or by the major resource areas (soil, water, forestry, wildlife).	0	2	4	6	8	10
4. Knowledge & impact of agricultural land presrvation and conservation.	0	2	4	6	8	10
5. Other environmental problems related to the issue.	0	2	4	6	8	10
B. Were references and resources were cited in the presentation?	0	2	4	6	8	10

Part 2: Application of the Data (80 points maximum)	**Circle Score** - post total here ===>					
A. Team demonstrated a solid understanding of the political issues related to the problem.	0	2	4	6	8	10
B. Team demonstrated a solid understanding of the environmental issues related to the problem.	0	2	4	6	8	10
C. Team demonstrated a solid understanding of the economic issues related to the problem.	0	2	4	6	8	10
D. Team demonstrated a solid understanding of social/cultural issues related to the problem.	0	2	4	6	8	10
E. Team presented ONE viable opinion/solution to the problem, addressing the resource issue.	0	2	4	6	8	10
F. All main parts of the presentation were clearly stated and supported.	0	2	4	6	8	10
G. Solution(s) presented address(es) the long-term sustainability of the resources.	0	2	4	6	8	10
H. The land use decision proposed addresses the concerns of all stakeholders.	0	2	4	6	8	10

Part 3: Quality of the Presentation (40 points maximum)	**Circle Score** - post total here ===>					
A. Presentation was well organized with a clear introduction and a strong conclusion.	0	2	4	6	8	10
B. Participants enhanced the presentation with eye contact, gestures, voice inflection, and originality.	0	2	4	6	8	10
C. Visual aids were used to support major points.	0	2	4	6	8	10
D. Questions from the judging panel were answered logically and concisely.	0	2	4	6	8	10

Part 4: Required Elements (20 points)	**Circle Score** - post total here ===>					
A. Two points for each team member that participated in oral presentation.	0	2	4	6	8	10
B. Up to five points if presentation was accomplished in the allotted time.	0	1	2	3	4	5
C. Up to five points if a plan (solution) was presented.	0	1	2	3	4	5

Part 1 total (60 points max) ---------

Part 2 total (80 points max) ----------

Part 3 total (40 points max) ---------

Part 4 total (20 points max) ----------

Final Score _____

16 A Clarification of the Envirothon Judging Sheet

In order to ensure the consistency of judging, the following guidelines have been prepared.
In general, the point values can be interpreted as follows (see a more detailed analysis for each category below):

0- Not at all.
2- Major misconceptions or gaps; ineffective, inadequate, inappropriate.
4- Some misconceptions or flaws; minimally effective, somewhat appropriate.
6- Complete, and accurate; effective, adequate and appropriate.
8- Complete, very detailed, logical, ideas well supported and well organized; highly effective, all details appropriate.
10- Profound, in-depth, done in an insightful manner; extremely effective, points to an extremely effective strategy.

AN EXPANSION OF EACH SECTION OF THE JUDGING SHEET:

PART I: PREPARATION AND PRESENTATION OF THE PLAN (60 POINTS MAX)

A. How well did the presentation address or identify:

1. The interrelationship between the environment, natural resources, and different natural resource management strategies?

0- Not at all.
2- Major flaws or misconceptions in the interrelationships.
4- Identified most of the key interrelationships but had some misconceptions or gaps
6- Identified key interrelationships appropriately and adequately, along with appropriate management strategies.
8- Presents major and minor interrelationships and management strategies in a clear and effective manner with supporting evidence.
10- Addresses all interrelationships and develops a most effective combination of management strategies in a logical, insightful and well defended manner addressing all aspects of the problem.

2. All the different players/interest groups affected by the problem?

0- No players identified.
2- Only one or two players identified with major flaws in their interests or who is affected.
4- Most of the players and their interests presented with some misconceptions or gaps.
6- All the major players identified appropriately with their viewpoints accurately expressed.
8- Major and minor players identified and their interests are accurately expressed in a well organized manner.
10- Very comprehensive analysis of the players and their needs and interests, done in a well organized and insightful manner clearly conveying the complexity of the issue. Done in a clear and very logical presentation.

The judging criteria for section A, 3-5 is similar. Use the following criteria for these sections: 3- 5. How well did the presentation address or identify: 3) The major natural resources areas (aquatics, forestry, soils, wildlife), 4) wetlands, 5) the specific environmental problem (the oral scenario)?

0- None at all.
2- Many of the issues involved are not covered or major misconceptions in addressing these issues.
4- All the main issues (where appropriate) are addressed but there are misconceptions or gaps in how they are addressed.
6- All key issues (where appropriate) are addressed in an adequate manner.
8- Major and minor issues (where appropriate) are addressed in a detailed and appropriate and logical manner with support information.
10- All major and minor issues affected (where appropriate) are addressed in a multidisciplinary manner. The analysis is profound, in-depth, done in an insightful manner. All issues addressed are done utilizing extremely effective strategies.

B. Were references and resources cited in the team presentation?

0- None cited
2- Only one or two sources are cited or citations are inappropriate for the their use.
4- Several resources cited, however there are gaps in the citations
6- Four or five resources cited and used appropriately.
8- Adequate resources cited from several different viewpoints supporting the major points of the presentation.
10- All points are supported with citations from many different viewpoints. Citations and resources used shows in-depth research and a desire to investigate all major areas of concern. Citations listed in an organized fashion.

PART II APPLICATION OF DATA (80 points maximum)

The format of the judging in sections A-D is very similar. For sections A-D judges can use the following criteria. The team demonstrated a solid understanding of: A) political, B) ecological/environmental, C) economic, D) social and cultural issue(s) related to the problem.

0- No (A- political, B- ecological/environmental, C- economic, D- social and cultural) issues considered.
2- Only a few of the considerations are mentioned or their understanding of the issues has major flaws.
4- Most of the major considerations are presented and addressed, however there are some misconceptions or gaps in the presentation.
6- All the major considerations are identified and addressed in an appropriate manner.
8- A detailed presentation of the considerations is given in a well supported and organized manner. A high level of understanding is also exhibited in the question and answer period.
10- The analysis of the issues is very complete and in-depth. These issues are presented in a well thought-out and insightful manner which shows a complete understanding of the considerations and how they should be addressed. A high level of understanding is also exhibited in the question and answer period.

E. The team presented ONE viable solution to the problem addressing the resource issue.

0- No plan presented.
2- The plan has major flaws and is inadequate or inappropriate.
4- The plan presented has numerous minor flaws with gaps in the topics it addresses.
6- The plan addresses all the key concerns and provides a reasonable solution to the problem.
8- The plan provided covers the concerns of the problem very completely, and is presented in a detailed, logical and well organized manner.
10- The plan provided addresses all the aspects of the problem in an elegant, in-depth manner. The solution developed is insightful, very effective, and efficient.

F. The main parts were clearly stated and supported, (conclusion was clearly defined and convincing).

0- No supporting details for the conclusions reached.
2- Supporting details are severely flawed, confusing, or have large gaps in the presentations. The conclusion does not match the material presented.
4- Some of the supporting details are provided but have some misconceptions or have several gaps. The conclusion is unclear or unconvincing.
6- All the main points are clearly stated with supporting details. The conclusion matches the supporting details.
8- The presentation is organized in a very logical manner. All the major and minor points are supported accurately and covers the topic completely. The conclusions clearly come from the body of the presentations and is very convincing. This includes clearly showing how the conclusion was reached after considering the alternatives.
10- The body of the presentation clearly lays out the details of the conclusion with supporting details. This Is done in a highly effective manner. The presentation is insightful and detailed leading to a most convincing conclusion. This includes clearly showing how the conclusion was reached was an extremely effective solution.

G. Solution in the presentation has potential to be applied or implemented with long term sustainability to natural resources.

0- No solution is provided.
2- The solution presented is unrealistic or has major misconceptions or flaws.
4- The solution presented Is somewhat workable but contains some misconceptions or flaws.
6- The solution presented is workable and presents solutions to short-term and long-term problems. The solution is adequate and accurate. It covers all the major areas of concerns.
8- The solution presented is detailed, complete and realistic. It provides for the long-term sustainability of natural resources in a cost effective and addresses all the concerns.
10- The solution presented provides an insightful, multidisciplinary approach to the problem. All natural resource concerns are dealt with in a manner which allows for short-term concerns and long-term sustainability. The solution proposed clearly supports how it addresses all the concerns by utilizing an extremely effective alternative.

H. Did the solution reflect or address the concerns of all affected groups and issues?

0- No attempt was made to address the concerns of affected groups and issues.
2- The needs of most groups affected or issues have not been addressed.
4- The needs of most groups have been considered but many have not been addressed adequately.
6- The needs of most groups and issues have been addressed in an adequate fashion.
8- The needs of all the groups and issues have been addressed in a complete and detailed manner.
10- The needs of all the groups and issues have been addressed by combining the common interests in the most effective manner while not jeopardizing the long-term sustainability of environment and balancing political, economic, social and cultural concerns. This is done in detailed and insightful manner that shows sensitivity to needs of all groups affected.

PART III QUALITY OF THE PRESENTATION (40 points maximum)

A. Presentation was well organized with a clear introduction and strong conclusion.

0- No introduction or conclusion.
2- Introduction and/or conclusion are very hard to follow with very little organization in the presentation.
4- Introduction and/or conclusion are somewhat difficult to follow. Minimal organization in the rest of the presentations.
6- Clear introduction and strong conclusions. Adequate organization throughout the presentation.
8- Clear introduction and strong conclusion. The presentation has a very logical flow and is very well organized.
10- Excellent organization throughout. The presentation is very easy to follow and compelling. The organization enhances the understanding and keep one's full attention throughout the presentation.

B. Participants enhanced the presentation (eye contact, gestures, voice inflection, originality, exhibited professionalism, etc.).

0- No attempt to engage the audience - monotone voice, no eye contact, etc.
2- Very limited presentation skills for a majority of the presenters leading to an ineffective presentation.
4- Several of the presenters have limited presentation skills.
6- All the presenters do an adequate job of presentations using the skills listed above.
8- All the presenters utilize good presentations skills leading to an effective presentation.
10- Extremely effective presentation skills used appropriately in a variety of ways leading to a creative and highly effective presentation.

C. Visual aids were used to make major points and show conclusions (visual aids should be correct, eye appealing, readable, neat, etc.).

0- No visuals.
2- Visuals are unreadable, messy, or contain major flaws in the information.
4- Visuals contain minor flaws or do not convey the major points or conclusions completely.
6- Visuals convey the major points and conclusion in an adequate manner, no spelling errors, readable, neat and appealing.
8- Visuals convey the major points and conclusions (including all the features listed above) in an particularly eye catching manner.
10- Creative and very effective use of visuals to convey the major points and conclusions. Visuals greatly enhance the presentation and are used in a highly appropriate manner.

D. Questions were answered logically and concisely by all team members participating.

0- No questions answered.
2- Answers contain many major misconceptions or gaps.
4- Answers contain some misconceptions or flaws.
6- Answers are accurate and adequate. All the team members are involved in answering the questions.
8- Answers given by all the members are concise and organized in a logical manner. All the details are appropriate.
10- Questions are answered in an insightful manner (as well as being logical and concise). The answers show an in-depth understanding of the material.

PART IV REQUIRED ELEMENTS (20 points)

A. Add up to ten points for each team member's participation in the presentation (Each team member gets up to 2 points for equal oral participation in presentation. (For each team member: 0- No participation, 1- limited participation, 2- full participation).

B. Add up to five points if the presentation was accomplished in the allotted time scale and the team made effective use of their time. (I pt.- presentation lasted 1-2 minutes, 2 pts.- presentation lasted 3-4 minutes, 3 pts.- presentation significantly over time limit (>6 minutes), 4 pts.- presentation within (±) 1 minute of the alloted time, 5 pts.- presentation within (±) 30 seconds of the alloted time.

C. Add up to five points if the presentation accomplished the task of presenting a plan.

0- No plan presented.
I- Plan with major misconceptions or gaps.
2- Plan with some misconceptions or flaws.
3- Plan is complete and accurate.
4- Plan is complete, very detailed, logical, well supported and well organized.
5- Plan is profound, in-depth, insightful and extremely effective.

17 Glosssary of Environmental Terms:

Adaptation: Changes in an organism's physiological structure or function or habits that allow it to survive in new surroundings.

Archaeology: study of past human cultures by examining the materials remains and other deposits left at archaeological sites such as shell rings and mounds. Trained professionals only conduct archaeology, but opportunities to visit with archaeologists often arise.

Artifact: An object that has been manipulated by human hands into a tool or implement.

Biltmore Stick: This scaling tool is a straight wooden stick graduated for direct readings of tree diameters and heights. The stick allows you to measure the diameter at a point 4.5 feet above stump height and also the merchantable height in terms of 16 foot logs. With these two measurements, the board foot volume of the tree may be determined. The actual volume table is printed on the stick.

Biodiversity: Refers to the variety and variability among living organisms and the ecological complexes in which they occur. Diversity can be defined as the number of different items and their relative frequencies. For biological diversity, these items are organized at many levels, ranging from complete ecosystems to the biochemical structures that are the molecular basis of heredity. Thus, the term encompasses different ecosystems, species, and genes.

Biological Oxygen Demand (BOD): An indirect measure of the concentration of biologically degradable material present in organic wastes. It usually reflects the amount of oxygen consumed in five days by biological processes breaking down organic waste.

Buffer Strip: A relatively undisturbed section of forest adjacent to an area requiring special attention or protection such as a stream or lake.

Carrying Capacity: 1. In recreation management, the amount of use a recreation area can sustain without loss of quality. 2. In wildlife management, the maximum number of animals an area can support during a given period.

Cave: Any natural cavity or series of cavities beneath the surface of the earth. Such cavities are usually classed as caves only if they are large enough to permit entrance by humans. The term is generally synonymous with cavern and is commonly applied also to wind- or water-eroded rock cavities.

Chiefdom: highest level of social organization reached by prehistoric Native Americans. Chiefdom usually has status differences, depends on an agricultural economy, build monumental architecture such as mounds.

Dichotomous Key: A two branched key that can help you quickly identify trees in the field. Leaves are used for the identifying characteristics. Each line in the key has two choices. Read the descriptions on these two lines and decide which fits your tree best. The choosing between two characterisics continues through the key until identification is complete.

Dissolved Oxygen (DO): The oxygen freely available in water, vital to fish and other aquatic life and for the prevention of odors. DO levels are considered a most important indicator of a water body's abililty to support desirable aquatic life. Secondary and advanced waste treatment are generally designed to ensure adequate DO in waste-receiving waters.

Ecofact: a non-artifact such as pollen, animal bones, and shellfish remains, antler tine or carving, carbonized materials such as wood, nuts, corn or other plant remains.

Ecosystem: The interacting system of a biological community and its non-living environmental surroundings.

Endangered Species: A species of native fish, wildlife, or plants found by the Secretary of the Interior to be threatened with extinction because its habitat is threatened with destruction, drastic modification, or severe curtail-

ment, or because of over exploitation, disease, predation, or other factors its survival requires assistance.

Feature: Features are of great interest to archaeologists. Features can be large like mounds or shell rings, or small like a posthole for a prehistoric house or a deposit of periwinkle shells within a shell ring. A hearth used 800 years ago to heat a clay walled hut is yet another type of feature.

Fecal Coliform Bacteria: Bacteria found in the intestinal tracts of mammals. Their presence in water or sludge is an indicator of pollution and possible contamination by pathogens.

Ground Water: The supply of fresh water found beneath the Earth's surface usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

Habitat: The physical area where an organism lives.

Impaired Streams: Streams that do not meet the water quality standards set by the state based on classified uses (ie. fishing, swimming, shellfish).

Karst: The typical surface terrain of a limestone region, characterized by an abundance of sinkholes, disappearing streams, exposed rock outcrops or ledges, and underground caverns.

Late Archaic Period: a period from roughly 5000-3000 years ago. During this time complex hunter-gatherer tribal societies began to construct shell rings, fashion pottery vessels and live a semi sedentary lifeway.

Limiting Factor: A condition whose absence or excessive concentration, is incompatible with the needs or tolerance of a species or population and which may have a negative influence on their ability to thrive.

Mississippian period: a period from 1000 to four hundred years ago. During this time earthen mound building, corn agriculture, and complex societies living in permanent villages were ruled by ruled by hereditary chiefs.

Mound: Artificially constructed village feature constructed of baskets loads or dirt, shaped like a truncated cone and used as a platform for chief's houses temples or both.

Non-Point Source of Pollution: Diffuse pollution sources (i.e. without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by storm water. Common non-point sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets.

Shell ring: Artificial deposit of shell occurring as a ring, crescent, horseshoe shape or mound of shell and other artifacts and ecofacts.

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18
Bibliography

WEBSITES

GENERAL

Canon Envirothon - www.envirothon.org

Academy of Natural Sciences - *choose the article index*
http://www.acnatsci.org/erd/ea

Clemson University Cooperative Extension Service
- choose Public Service Activities - Extension
http://www.clemson.edu/

Environmental Literacy Council
http://www.enviroliteracy.org/

Librarians Index to the Internet
http://sunsite.berkeley.edu/InternetIndex/

Scientific American: Ask the Experts
http://www.sciam.com/askexpert/

South Carolina Department of Health and Environmental Control
http://www.state.sc.us/dhec

South Carolina Department of Natural Resources
http://www.dnr.state.sc.us

South Carolina Forestry Commission
http://www.state.sc.us/forest

South Carolina State Library
http://www.state.sc.us/scsl/

Environmental Education Link
http://www.nceet.snre.umich.edu

Environmental Protection Agency - Acting Locally - Information for Citizens
http://www.epa.gov/epahome/acting.htm

Internet Public Library - click on both biology and environmental science
http://www.ipl.org/ref/RR/static/sci0000.html

Teaching KATE (Kids About The Environment)
http://www.teachingkate.org

USDA Natural Resources Conservation Service
http://www.nrcs.usda.gov/

U.S. Geologic Survey - has biology and geology information and sources
http://www.usgs.gov/

South Carolina Legislature
http://www.Leginfo.state.sc.us

Soil and Water Conservation Society *- click on Public Policy and Organization Links*
http://www.swcs.org

EPA National Service Center for Environmental Publications
http://www.epa.gov/ncepihom/

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SOILS

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http://www.brynmawr.edu/Acads/Geo/Soil/ProcessHome.html

Earth and Sky, geology and astronomy, ask an expert, Feature articles
http://www.earthsky.com

National Soil Survey Center
http://www.statlab.iastate.edu/soils/nsdaf/

USDA NRCS Technical References
http://www.ftw.nrcs.usda.gov/tech_ref.html

USDA NRCS World Soil Resources Website
http://www.nhq.nrcs.usda.gov/WSR/

Dr. Soils Surfs - a searchable index of soils webpages
http://www.agri.upm.edu.my/jst/drsoil.html

How to Measure Soil Texture (low tech and easy)
http://weather.nmsu.edu/Teaching_Material/soil456/soiltexture/soiltext.htm

University of Florida Cooperative Extension (excellent explanation of soil texture triangle and field determination techniques)
http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_SS169

United Nations Environment Program (global soil database - see data access section)
http://grid2.cr.usgs.gov/

WATER

EPA's Office of Water Homepage: www.epa.gov/ow

DHEC's Bureau of Water: www.scdhec.gov/water

USGS Water Science for Schools: ga.water.usgs.gov/edu

Center for Watershed Protection: www.cwp.org

Surf your watershed: www.epa.gov/surf

Know your watershed: www.ctic.purdue.edu

Ohio State NPS Pollution primer: www.ag.ohio-state.edu/~ohioline/aex-fact/0465.html

SC Home*A*Syst - program for reducing Household NPS http://virtual.clemson.edu/groups/waterquality/HOMASYS.HTM

CIESE Collaborative Projects - Global Water Sampling Project (background, procedures, and expected test result ranges for water quality tests) http://www.k12science.org/curriculum/waterproj/watersamplingtests.shtml

Stream Study (aquatic macroinvertebrates and sampling procedures) http://wsrv.clas.virginia.edu/~sos-iwla/

Groundwater http://www.groundwater.org

The Hydrologic Cycle – online meteorology guide
http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/hyd/home.rxml

Groundwater Basics from the Groundwater Primer, Purdue University http://www.purdue.edu/dp/envirosoft/groundwater/src/basics.htm#menu"

How to delineate a watershed (and read a topographic map) (NH NRCS)
http://www.nh.nrcs.usda.gov/technical/WS_delineation.html

Congressional Research Service Report – Safe Drinking Water Act Ammendments of 1996
http://cnie.org/NLE/CRSreports/water/h2o-17.cfm

Bibliography

EPA's Watershed Academy Web: Introduction to the Clean Water Act(html version), http://www.epa.gov/watertrain/cwa/
(pdf version, 4.3MB, 70 pages) http://www.epa.gov/watertrain/pdf/IntrotoCWA.pdf

FORESTRY

Learning Objective	Resource
1. Identify Common Trees	*Tree Identification for SC*; forester
2. Identify trees with a key	*Tree Identification, A Guide to Helping Your Students Learn Tree ID;* forester
3. Understand wildlife habitat...	*Forest Mgt. & Wildlife*
4. Understand forest management....	*Managing the Family Forest in the South: The Natural Role of Fire*
5. Be able to use Biltmore stick	*Making & Using Your Own Cruiser Sitick;* forester
6. Understand urban tree value	*Benefits of Urban Trees*
7. Understand BMP's	*Forestry BMP's*

8. Understand climate change
http://www.gov.mb.ca/est/climagechange/pdfs/cc_primerdoc.pdf

WILDLIFE

Nearctica: natural history of North America
http://www.nearctica.com/index.htm

U.S. Fish and Wildlife Service - Endangered species website
http://www.fws.gov/r9endspp/endspp.html

USFWS - National Wildlife Refuge System Management
http://refuges.fws.gov/wildlife.html

USFWS - Southeast Region
http://www.fws.gov/r4eao/

National Wildlife Federation
http://www.nwf.org/

South Carolina Wildlife Federation
http://www.scwf.org/

National Audubon Society's explanation of the Endangered Species Act
http://www.audubon.org/campaign/esa/Basics.htm

REFERENCES - CURRENT ISSUE

http://gcmd.gsfc.nasa.gov/

http://globalwarming.enviroweb.org/

http://www.nrc-cnrc.gc.ca/main_e.html

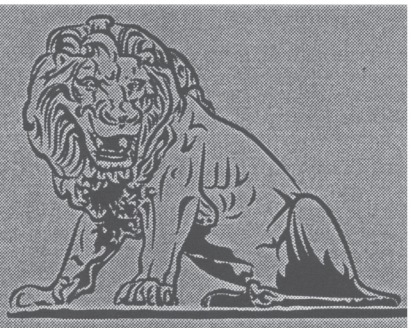
http://www.usgcrp.gov/usgcrp/nacc/alaska.htm

http://pubs.usgs.gov/fs/fs-0071-97/

Other references
Victor, David G. and Julian E. Salt. 1994. Climate Change Environment 36:7-15: 25-27

U.S. Energy Information Agency, Department of Energy. International Energy Outlook. 1998, with projection through 2020

Envirothon Information Pathfinder



South Carolina State Library

P.O. Box 11469
1500 Senate Street
Columbia, SC 29211

www.state.sc.us/scsl/

Phone:803-734-8666
Fax: 803-734-4757
reference@leo.scsl.state.sc.us

The school media center and the public library are excellent places to locate the facts and information that you need to compete in South Carolina's **Envirothon.** The South Carolina State Library has developed pathfinders for each topic to assist you in finding information in your local library or through the Internet. Your local librarian can also help you find the sources you need.

Books and Reports

Go to the library's catalog and search for titles under the following subject headings:

AQUATICS

Water
Groundwater
Water quality
Water conservation
Water Supply

SOIL

Soils
Soil conservation
Soil erosion
Soil surveys

FOREST

Forests and forestry
Forest conservation

WILDLIFE

Wildlife
Nature conservation
Wildlife conservation
Ecology
Wildlife management
Endangered species

South Carolina's Virtural Library

DISCUS—South Carolina's Virtual Library is coordinated by the South Carolina State Library.

For more information ask the librarian at your local library or school media center.

Online Databases

Full text information contained in magazines, newspapers, govemment reports and encyclopedias are available in the following databases at your library and school media center:

InfoTrac databases include the full text of articles from about 1500 magazine and professional journal titles; the full text of reference books, pamphlets, and news wire services; abstracts of articles from several thousand additional periodical and newspaper titles.

Grolier Online Encyclopedias includes Encyclopedia Americana Online and Grolier Multimedia Encyclopedia Online.

SIRS KnowledgeSource covers social, scientific, arts, and other topics, providing full-text articles from a wide variety of sources. Databases include SIRS Researcher and SIRS Government Reporter.

Internet

The Internet can be an excellent source for information on the Envirothon topics. There is a list of selected sites in your Envirothon manual. Be sure to check out your favorite search engine for additional information. Don't forget to evaluate the Internet site for accuracy, currency, content and organization.

South Carolina Department of Health and Environmental Control
Regional Environmental Quality Control Offices

Anderson EQC Office - **Region 1**
(Anderson, Oconee)
2404 N. Main Street
Anderson, SC 29621-3275
(864) 260-5569 Fax: (864) 260-4855

Greenwood EQC Office - **Region 1**
(Abbeville, Edgefield, Greenwood, Laurens, McCormick, Saluda)
613 South Main Street
Greenwood, SC 29646-3245
(864) 223-0333 Fax: (864) 223-6935

Greenville EQC Office - **Region 2**
(Greenville, Pickens)
301 University Ridge, Suite 5800
Greenville, SC 29601-3677
(864) 241-1090 Fax: (864) 241-1092

Spartanburg EQC Office - **Region 2**
(Cherokee, Spartanburg, Union)
975-C North Church Street
Spartanburg, SC 29303-2712
(864) 596-3800 Fax: (864) 596-2136

Columbia EQC Office - **Region 3**
(Fairfield, Lexington, Newberry, Richland)
Bldg #5 / PO Box 156
State Park, SC 29147-0156
(803) 896-0620 Fax: (803) 896-0617

Lancaster EQC Office - **Region 3**
(Chester, Lancaster, York)
2475 DHEC Road / PO Box 100
Fort Lawn, SC 29714-0100
(803) 285-7461 Fax: (803) 285-5594

Florence EQC Office - **Region 4**
(Chesterfield, Darlington, Dillon, Florence, Marion, Marlboro)
145 E. Cheves Street
Florence, SC 29506-2526
(843) 661-4825 Fax: (843) 661-4858

Sumter EQC Office - **Region 4**
(Clarendon, Kershaw, Lee, Sumter)
105 Magnolia Street / PO Box 1628
Sumter, SC 29151
(803) 778-6548 Fax: (803) 773-6366

Aiken EQC Office - **Region 5**
(Aiken, Allendale, Bamberg, Barnwell, Calhoun, Orangeburg)
206 Beaufort Street, NE
Aiken, SC 29801-4476
(803) 641-7670 Fax: (803) 641-7675

Myrtle Beach EQC Office - **Region 6**
(Horry, Georgetown, Williamsburg)
927 Shine Avenue
Myrtle Beach, SC 29577-3580
(843) 238-4378 Fax: (843) 238-4518

Charleston EQC Office - **Region 7**
(Berkeley, Charleston, Dorchester)
1362 McMillan Avenue, Suite 300
Charleston, SC 29405
(843) 740-1590 Fax: (843) 740-1595

Beaufort EQC Office - **Region 8**
(Beaufort, Colleton, Hampton, Jasper)
104 Parker Drive
Burton, SC 29906
(843) 846-1030 Fax: (843) 846-0604

20 Society of American Foresters

South Carolina Chapters:

Contact the forester in your area for:
1. Help in preparing students for Envirothon
2. Asistance in finding forestry tools.

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Society of American Foresters

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Horry-Georgetown Student Chapter (AP3010)

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F:

Society of American Foresters

Map of SAF Chapters in South Carolina

Contact the SAF chapter chair in your area for:
1. Help in preparing students for Envirothon
2. Assistance in finding forestry tools
3. Financial help (a chapter may help sponsor your school's group)

Foresters with S. C. Forestry Commission to Contact for Woodland Examinations, Timber Stand Improvement, Tree Planting, Timber Marking, Urban Forestry Assistance, etc.

County	Phone (H)	Forester	Phone (O)	Business Address
Abbeville	(864)446-8722	R. J. Counts	(864)459-2337	Box 863, Abbeville, 29620
Aiken	(803)649-2956		(803)259-3373	7695 Highway 64, Barnwell, 29812
Allendale	(803)649-2956		(803)259-3373	7695 Highway 64, Barnwell, 29812
Anderson	(864)226-8476	J. Kirk Weyman	(864)225-9701	P.O. Box 1041, Anderson, 29621
Bamberg	(803)649-2956		(803)259-3373	7695 Highway 64, Barnwell, 29812
Barnwell	(803)649-2956		(803)259-3373	7695 Highway 64, Barnwell, 29812
Beaufort	(843)726-5372	Pete Stuckey	(843)943-3915	P.O. Box 486, Hampton, 29924
Berkeley	(843)853-7163	Frances Melfi	(843)556-3371	2730 Savannah Highway, Charleston, 29414
Calhoun	(803)534-3543			353 Fire Tower Road, Orangeburg, 29118
Charleston	(843)571-5781	Frances Melfi	(843)556-3371	2730 Savannah Highway, Charleston, 29414
Cherokee	(803)324-2472	Roy Boyd	(803)684-4311	13 South Congress Street, York, 29745
Chester	(803)324-2472	Roy Boyd	(803)684-4311	13 South Congress Street, York, 29745
Chesterfield	(843)537-0109	Kenny Robertson	(843)498-6918	16222 Highway 1, Patrick, 29584
Clarendon	(803)494-5451	Ben Fishburne	(803)494-8488	5500 Wedgefield Highway, Wedgefield, 29168
Colleton	(843)	Bill Reasonover	(843)538-3708	413 Sidneys Road, Walterboro, 29488
Darlington	(843)498-6918			16222 Highway 1, Patrick, 29584
Dillon	(843)382-9520	Ron Holt	(843)423-3722	136 Airport Court, Mullins, 29574
Dorchester	(843)853-7163	Frances Melfi	(843)556-3371	2730 Savannah Highway, Charleston, 29414
Edgefield	(864)446-8722	R.J. Counts	(864)459-2337	Box 863, Abbeville, 29620
Fairfield	(803)364-0528	Chase Folk	(803)276-3823	39 General Henderson Road, Newberry, 29108
Florence	(843)382-9520	Ron Holt	(843)423-3722	136 Airport Court, Mullins, 29574
Georgetown	(843)382-8761			596 I.M. Graham Road, Kingstree, 29556
Greenville	(864)226-8476	Paul Dulin	(864)467-2755	301 University Ridge, Suite 3900, Greenville 29601
Greenwood	(864)446-8722	R.J. Counts	(864)459-2337	Box 863, Abbeville, 29620
Hampton	(843)726-5372	Pete Stuckey	(843)943-3915	P.O. Box 486, Hampton, 29924
Horry	(843)382-9520	Ron Holt	(843)423-3722	136 Airport Court, Mullins, 29574
Jasper	(843)726-5372	Pete Stuckey	(843)943-3915	P.O. Box 486, Hampton, 29924
Kershaw	(803)494-5451	Ben Fishburne	(803)494-8488	5500 Wedgefield Highway, Wedgefield, 29168
Lancaster	(843)537-0109		(803)498-6918	16222 Highway 1, Patrick, 29584
Laurens	(864)446-8722	R.J. Counts	(864)459-2337	Box 863, Abbeville, 29620
Lee	(803)494-5451	Ben Fishburne	(803)494-8488	5500 Wedgefield Highway, Wedgefield, 29168
Lexington	(803)364-0528	Chase Folk	(803)276-3823	39 General Henderson Road, Newberry, 29108
McCormick	(864)446-8722	R. J. Counts	(864)459-2337	P.O. Box 863, Abbeville, 29620
Marion	(843)382-9520	Ron Holt	(843)423-3722	136 Airport Court, Mullins, 29574
Marlboro	(843)537-0109		(843)498-6918	16222 Highway 1, Patrick, 29584
Newberry	(803)364-0528	Chase Folk	(803)276-3823	39 General Henderson Road, Newberry, 29108
Oconee	(864)226-8476	Kirk Weyman	(864)225-9701	P.O. Box 1041, Anderson, 29621
Orangeburg	(803)534-3543			353 Fire Tower Road, Orangeburg, 29118
Pickens	(864)226-8476	Kirk Weyman	(864)225-9701	P.O. Box 1041, Anderson, 29621
Richland	(803)364-0528	Chase Folk	(803)276-3823	39 General Henderson Road, 29108
Saluda	(864)446-8722	R.J. Counts	(864)459-2337	Box 863, Abbeville, 29620
Spartanburg	(803)324-2472	Roy Boyd	(803)684-4311	13 South Congress Street, York 29745
Sumter	(803)494-5451	Ben Fishburne	(803)494-8488	5500 Wedgefield Highway, Wedgefield, 29168
Union	(803)324-2472	Roy Boyd	(803)684-4311	13 South Congress Street, York, 29745
Williamsburg	(843)382-8761			596 I.M.Graham Road, Kingstree, 29556
York	(803)324-2472	Roy Boyd	(803)684-4311	13 South Congress Street, York, 29745

21 South Carolina Department of Natural Resources

Conservation Districts of South Carolina:

Abbeville District Office
394 Highway 28 By-Pass
Abbeville, SC 29620
(864) 459-5419, ext. 3

Aiken District Office
1555 Richland Avenue,
Suite 400
Aiken, SC 29801
(803) 649-4221, ext. 3

Allendale District Office
398 Barnwell Highway, Rm.113
Allendale, SC 29810
(803) 584-4234, ext. 3

Anderson District Office
1521 Pearman Dairy Road
Anderson, SC 29625
(864) 224-4201

Bamberg District Office
3828 Main Highway
Bamberg, SC 29003
(803) 245-4311, ext. 3

Barnwell District Office
100 Fuldner Road
Barnwell, SC 29812
(803) 259-7144

Beaufort District Office
817 Parris Ave.
P.O. Box 70
Port Royal, SC 29935
(843) 522-8100

Berkeley District Office
P.O. Box 6122, 1003 Hwy 52
Moncks Corner, SC 29461
(843) 719-4146

Calhoun District Office
904 F.R Ruff Dr. Ste. 104
P.O. Box 528
St. Matthews, SC 29135
(803) 874-3337, ext. 3

Charleston District Office
4045 Bridge View Drive,
Suite C-204
North Charleston, SC 29405
(843) 727-4160, ext. 3

Cherokee District Office
1252 Overbrook Drive, Suite 5
Gaffney, SC 29341
(864) 489-7150

Chester District Office
744 B. Wilson Street
Chester, SC 29706
(803) 581-1908, ext. 3

Chesterfield District Office
106 Scotch Road
Chesterfield, SC 29709
(843) 623-2187, ext. 3

Clarendon District Office
9B West Rigby Street
Manning, SC 29102
(803) 435-2612, ext. 3

Colleton District Office
531 Robertson Blvd., Suite B
Walterboro, SC 29488
(843) 549-1821, ext. 3

Darlington District Office
300 Russell Street, Rm. 228
Darlington, SC 29532
(843) 393-0483, ext. 3

Dillon District Office
106 West Washington Street
P.O. Box 609
Dillon, SC 29536
(843) 774-8641 or 9577

Dorchester District Office
5809 W. Jim Bilton Blvd.
St. George, SC 29477
(843) 563-3218, ext. 3

Edgefield District Office
304 Gray Street
Edgefield, SC 29824
(803) 637-3220, ext. 3

Fairfield District Office
414 B. South Congress Street
Winnsboro, SC 29180
(803) 635-4831

Florence District Office
215 Third Loop Rd.
Ste. 400
Florence, SC 29505
(843) 669-9686, ext. 3

Georgetown District Office
1837 N. Fraser Street
Georgetown, SC 29440
(843) 546-7808

Greenville District Office
301 University Ridge,
Suite 3900
Greenville, SC 29601
(864) 467-2755

Greenwood District Office
115 Enterprise Court, Ste. A-1
Greenwood, SC 29649
(864) 229-3004, ext. 3

Hampton District Office
1005 Elm Street, East
Hampton, SC 29924
(803) 943-2586, ext. 3

Horry District Office
1949 Industrial Park Road,
Rm. 125
Conway, SC 29526
(843) 365-7923

Jasper District Office
P.O. Box 210 Fed. Bldg.
Ridgeland, SC 29936
(843) 726-7611. ext. 3

Kershaw District Office
1126 Little Street
Camden, SC 29020
(803) 432-2576

Lancaster District Office
107 S. French Street
P.O. Box 3005
Lancaster, SC 29721
(803) 286-8135

Laurens District Office
221 A Laurens Street
Laurens, SC 29360
(864) 984-6921

Lee District Office
129 Fairview Avenue
Bishopville, SC 29010
(803) 484-6325

Lexington District Office
123 Park Road
Lexington, SC 29072
(803) 359-3165, ext. 3

Marion District Office
119 Palmetto Pointe Dr.
Ste. A
Marion, SC 29571
(843) 423-1742

Marlboro District Office
210 Throop Street
Bennettsville, SC 29512
(843) 479-4552

McCormick District Office
P.O. Box 126
McCormick, SC 29835
(864) 465-2594

Newberry District Office
719 Kendall Road
Newberry, SC 29108
(803) 276-0032, ext. 3

Oconee District Office
301 W. South Broad Street
Walhalla, SC 29691
(864) 638-2213, ext. 3

Orangeburg District Office
1550 Henley Street, NE,
Rm. 103
Orangeburg, SC 29115-5020
(803) 534-2409, ext. 3

Pickens District Office
P.O. Box 245
222 McDaniel Avenue
Pickens, SC 29671
(864) 878-6155

Richland District Office
2020 Hampton Street, Rm. 3044
P.O. Box 192
Columbia, SC 29202
(803) 576-2080

Saluda District Office
201 East Church Street
Saluda, SC 29138
(864) 445-8118

Spartanburg District Office
105 Corporate Drive
Ste. G
Spartanburg, SC 29306
(864)814-2471

Sumter District Office
1975 Castlerock Dr.
Sumter, SC 29153
(803) 905-7650, ext. 3

Union District Office
200 S. Mountain Street
P.O. Box 1136
Union, SC 29379
(864) 429-2801

Williamsburg District Office
502 Martin Luther King Jr. Ave
Kingstree, SC 29556
(843) 354-9621

York District Office
1460 E. Alexander Love Hwy.
York, SC 29745
(803) 684-3137, ext. 101

Notes:

Notes: